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Territorial Use Rights in Chilean Fisheries

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Introduction

Today, artisanal fisheries management measures in Chile consider the allocation of Territorial Use Rights in Fisheries (TURFs) among fishing communities traditionally exploiting benthonic resources such as Chilean abalone (*Concholepas concholepas*), sea urchins (*Loxechinus albus*) and macha clams (*Mesodesma donacium*), among others. Chilean fisheries legislation, the General Fisheries and Aquaculture Law (GFAL) enacted in 1991, allows the establishment of areas especially reserved for the use of specific artisanal fishing communities, through their legally constituted organizations (*e.g.*, artisanal fishermen's associations and fishermen's cooperatives, among others).

According to the GFAL, these areas are labeled as "Areas for Management and Exploitation of Benthonic Resources" (AMEBR), and may be allocated to artisanal fishing communities for a two-year period (upon submission and approval of a management and exploitation project related to a relevant benthonic resource). AMEBR may only be established in a strip of territorial waters ranging from the line of the lowest tide to 5 miles offshore, stretching from the northern border of Chile to the parallel 41° 28.6′ south, as well as on inland and interior waters (mainly channels, fjords, rivers, lakes, and lagoons), reserved exclusively to artisanal fishing according to the GFAL. Upon completion of the two-year period, TURFs may be extended to an aquaculture lease in order to further exploit the AMEBR.

Origin and Objectives of the AMEBR System in Chile

Artisanal capture fisheries based on benthonic resources in Chile have traditionally exploited high-valued products for direct consumption, first at the local and national level and, later, for export to growing international markets. The open-access conditions in which these fisheries are undertaken, along with high market prices and low operational costs, have led to increased effort and fishing pressure. The resulting over-exploitation of some of these resources has forced the government to put strict control measures in place. A good example of this is the Chilean abalone fishery which dates from pre-Hispanic times. Based on statistical records and information reported by Jeréz (1993), ICSED (1994) states that the development of this fishery shows four distinct periods.

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Period 1 – 1938 to 1975: During this period, production was directed to local consumption, fresh or canned products, with landings which averaged 850 metric tons (mt) per year until 1955, and 4,000 tons per year until 1975.

Period 2 – 1976 to 1980: This second period is characterized by a steep increase in landings, reaching a record of 24,800 mt per year in 1980, as a result of a national policy to gain a position in international markets.

Period 3 – 1981 to 1988: This period is characterized by a large decrease in landings, in spite of the increasing fishing effort, which led the government to take a series of administrative measures in an attempt to restrain resource over-exploitation (*e.g.*, temporary or area closures and global quotas, among others). In 1988, a national global quota, or total allowable catch (TAC), and a 15-day harvest period was determined. Five days after the beginning of the fishing period, the TAC was surpassed with landings reaching more than twice the TAC. Inter-regional migrations of fishermen took place, which induced serious use conflicts. This situation led the government to impose a national closure from August 1988 to July 1989. In spite of these measures, the number of fishermen continued to increase, reaching about 16,000 persons in 1989, representing a 36% increase from 1983 levels (Undersecretary of Fisheries 1994). Export statistics in volume and value in table 1 show that the industry reached a record of approximately 4,800 tons in 1984 valued at US$19 million, with an average per unit value of $3.96/kg. In 1987 the industry reached a record in foreign earnings of US$43.7 million for 4,000 tons with an average per unit value of $10.93/kg.

Period 4 – 1989 to present: This period is characterized by the extension of the national closure until December 1992, actually a three year moratorium. In July 1992 the government, based on the GFAL, declared the fishery under "full exploitation" and accordingly, applied the "Benthonic Regime of Harvest and Process," which allocates global and individual capture and processing quotas.[1] In 1993, the fishery opened twice for a 5 day period each time and with a TAC of about 12 and 16 million units, respectively. The TAC was allocated only to registered fishermen in individual non-transferable quotas. Inter-regional migrations of fishermen were not allowed. Although there was apparent success obtained by these administrative measures, international market import statistics show significant levels of product harvest and exports between 1989 and 1992. Given the moratoriums which were in place during that time, most of these exports must have been illegally harvested products. Table 1 shows that official export volumes and values drastically declined from 1989 until 1992, but reached a new record in export earnings in 1993 with approximately US$63.6 million and 2,400 mt of canned and frozen product exported. During 1993 and 1994, the communication media (newspapers and television, among others) reported several cases of illegal landings and product processing and transportation. Thus, there were difficulties in enforcing the administrative measures undertaken and in removing incentives to not abide by them.

Other artisanal fisheries, based on benthonic resources such as sea urchins, macha clams, and scallops (*Argopecten purpuratus*), have experienced development paths similar to the Chilean abalone fishery, reaching either full exploitation or over-exploitation in their traditional harvest areas. Thus, an administrative measure

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[1] According to the GFAL, the condition of full exploitation of a fishery is the situation in which the fishery reaches a level of exploitation that, with the harvest of authorized fishing units, there does not exist a surplus in the productive capacity of the exploited species.

Table 1
Exports of Chilean Abalone (*Concholepas Concholepas*)
in Volume (MT) and Value (Thousand US$), 1983–95

	Canned		Frozen		Total	
Year	MT	US$,000 (FOB)	MT	US$,000 (FOB)	MT	US$,000 (FOB)
1983	2,010.0	9,251.0	2,658.0	7,611.0	4,668.0	16,864.0
1984	1,897.0	8,830.0	2,873.0	10,520.0	4,770.0	19,350.0
1985	1,516.0	9,676.0	2,102.0	12,077.0	3,618.0	21,753.0
1986	683.0	7,162.0	1,598.0	15,114.0	2,281.0	22,276.0
1987	2,369.0	29,286.0	1,638.0	14,190.0	4,007.0	43,743.0
1988	1,502.0	14,697.0	2,504.0	19,635.0	4,006.0	34,332.0
1989	478.0	4,172.4	714.2	5,331.7	1,205.3	9,909.6
1990	48.7	578.5	84.0	828.7	132.7	1,407.2
1991	195.2	2,247.3	15.1	182.7	210.3	2,430.0
1992	16.1	178.0	0.0	0.0	16.1	178.0
1993	1,957.6	53,499.0	434.8	10,153.0	2,392.4	63,652.0
1994	519.0	8,865.0	1,012.0	13,228.0	1,622.0	22,780.0
1994	982.0	13,506.0	786.0	10,107.0	1,777.0	24,097.0

Source: IFOP - Subpesca 1994 and Irarrazabal (pers. com.).

such as AMEBR is seen, on the one hand, as an efficient tool to cope with the roots of the problem; namely, the uncontrolled increment in fishing effort induced by attractive markets in the presence of open access conditions, leading to resource overexploitation and social losses (Barrios and Aranguez 1993; Castilla, *et al.* 1993; Chamorro 1993; Jeréz and Potocnjak 1993; Pavéz 1993). On the other hand, AMEBR is also seen as an alternative measure to cope with inefficiencies in enforcing fisheries regulations, through the transference of management responsibilities from a central authority to artisanal fishing communities (Chamorro 1993; D.S. 355, 12 June 1995). Accordingly, the regulations for AMEBR (D.S. 355, 12 June 1995) justify their establishment on the grounds that it is an ideal instrument for the conservation and rational use of benthonic resources, as well as in guiding the collaboration of artisanal fishermen organizations in fisheries management.

The same set of regulations (D.S. 355, 12 June 1995), defines the AMEBR as a geographical area granted to an artisanal fishermen organization for the implementation of a management and exploitation project (MEPR) related to one or more benthonic resources (*i.e.*, main species or group of species). A MEPR must include a proposal for a Base Line Study of the AMEBR situation and the formulation of a management and exploitation plan (MEP) of the area and related main benthonic resources.[2] Additionally, the technical terms of reference for the request of an AMEBR by an artisanal fishermen's organization must consider the following aspects, among others:

1) The requested area must be part of the areas declared as available for the establishment of AMBER by the Ministry of Economy, which contains the Chilean Fisheries Undersecretary and the National Fisheries Service. This area must not overlap, totally or partially, another area previously established or requested for aquaculture or AMEBR purposes;

[2] The GFAL defines a management plan as a summary of norms and a set of actions allowing the management of a fishery, based upon the present knowledge of biological, technological, economic, and social aspects associated with that fishery.

2) The area must be the natural habitat of the main species targeted by the MEPR;

3) The MEP must address resource and environmental conservation, implementing all necessary measures to avoid negative impacts on the environment;

4) The MEPR cannot consider the introduction of individuals (of the main species) from other areas outside the AMBER. Notwithstanding, introduction of aquaculture-raised seedlings (of the main species) may be allowed; and in duly justified cases, a one-time introduction of individuals from outside the AMBER may also be allowed;

5) The MEP does not allow the clearing and/or re-location outside the AMEBR of individuals from a secondary species. However, the determination of mortality rates, catch or remotion quotas of secondary species, based upon the results of a specific study, may be allowed.

The objectives of the Base Line Study (D.S. 355, 12 June 1995) are:

1) Description of the benthonic community existing in the area (emphasis on species of economic or ecological importance);

2) Direct quantification of the main species;

3) Identification, characterization and distribution of existing types of sub-strata and their depth.

The requirements of the MEP are not specified in the D.S. 355, 12 June 1995. However, the minimum contents of the MEP are listed as follows in the same document:

1) The main and secondary objectives of the MEP;

2) The methodological approach, based upon the results of the Base Line Study, indicating different studies to be conducted in order to support the MEP of the requested area;

3) The description and justification of a set of actions directed to support the productivity of the targeted main species;

4) A proposal of a yearly exploitation plan of the requested area, specifying harvest periods and techniques, as well as the criteria applied to determine the quantity to be harvested of the main species;

5) A program containing a full description of required activities and related timetable;

6) Expected results of the MEP.

A More Conceptual Approach for the Establishment of AMEBR

The establishment of an AMEBR should involve the adequate consideration of the various factors intervening in the use and/or preservation of resources. Among the

most relevant biological and ecological factors are the assimilative and carrying capacities of the environment, the resource abundance and their reproductive and regenerative rates. Relevant technological factors include knowledge, technology, and tools used in productive processes and in actions seeking resource preservation. Economic factors include capital, labor, market conditions, and individual preferences. The social structure defining individual preferences, the cultural context in which economic activities and preservation actions are developed, and the legal-institutional framework restricting the exploitation or preservation of resources, are among the relevant social factors to be considered. Economic sectors such as capture fisheries, aquaculture, tourism, commerce, and urban development are involved in the use of aquatic ecosystems and hydro-biological resources The government, academicians, researchers, and communities are involved, either directly or through their representatives, in the preservation of these ecosystems and resources. All these sectors use, preserve, and compete in the allocation of natural and environmental resources.

Irrational exploitation and the impacts generated by the applied productive technology implies alterations to the environment and the economic activities based upon it, which are seldom considered by those generating them. Such impacts are externalities and their uncontrolled presence prevents the attainment of a sustainable development of the economic activities generating or receiving them and of society. Thus, given the dynamic characteristics of aquatic ecosystems and hydro-biological resources, in conjunction with the multiplicity and simultaneity of factors involved in the exploitation and/or preservation, it becomes clear that there is a need to adopt an ecosystemic, integral, dynamic, and quantitative approach in the establishment of the AMEBR.

It is necessary to highlight that the AMEBR as a management instrument should be considered as a relevant element of a larger fisheries management system. In this context, and according to Agüero (1994) and ICSED (1995), the creation and implementation of a management plan for the establishment of AMEBR involves the use of managerial and strategic planning principles to define the objectives sought through the management of aquatic and hydro-biological resources, including development and management purposes. The definition of objectives, then, requires: (*i*) the analysis of the surroundings (resources, environment, technologies, economic and financial aspects, social and legal-institutional aspects); (*ii*) the identification of strengths and weaknesses (from the perspective of the resources and the environment, as well as from that of economic activities and the prevailing establishment); and (*iii*) the consideration and analysis of characteristics and potentials of involved agents (users and managers) in order to identify the competitive advantages of the activities and the country, and to determine opportunities and risks associated to activities and resource development and management. From the above, it is possible to define a coherent and realistic set of objectives related to the different alternative of use and/or preservation of aquatic ecosystems and resources. As part of this, it is necessary to identify and define different use and/or preservation alternatives in harmony with the determined objectives and based upon various scenarios possible to consider under the prevailing legal and institutional framework. It is also necessary to design and establish a management plan which will allow for attaining the determined objectives. Relevant elements of this management plan are: (*i*) A strategy allowing to define, based upon the previously determined objectives and defined use- exploitation and/or preservation alternatives, the desired configuration of the AMEBR and their management system. This requires the determination of the desired scope, competitive advantages, the definition of short-, medium-, and long-run goals, and the allocation of human and capital resources; (*ii*) Management policies defining the operative framework for the implementation of the plan and the control of its performance; (*iii*) The regulation instruments, which in a conceptual framework are the tools required to implement the management plan (*i.e.*, control variables); and (*iv*) The administrative measures, which are the tangible and operational tools to implement the management plan.

Contrasting the Present AMEBR with the Theoretically Optimal AMEBR

The definition of AMEBR from the D.S. 355 of 12 June 1995 emphasizes conservation and rational use objectives. On one hand, even though conservation is a required and desirable objective, it is only a necessary condition, but not a sufficient condition to attain sustainable development and intertemporally maximize social net benefits from aquatic ecosystem and resource exploitation and/or preservation. On the other hand, rational use is not being defined and it is left to the fishermen communities to decide upon it. Even though participation is being increasingly recognized as a fundamental element to reach equitable resource allocation and benefit distribution (World Bank 1995), it is not sufficient by itself to reach sustainable development. Thus, it is necessary to recognize that the use of natural and environmental economic principles and the ecosystemic, integrated, dynamic, and quantitative approach presented above will help to design and implement a more efficient AMEBR system. It is also the centerpiece for a more rational and efficient decision making process leading to sustainable development and optimal resource allocation among competing uses over time.

The D.S. 355 of 12 June 1995 and the GFAL contain several other important elements to be considered in the design and implementation of AMBER, such as area identification and characterization, species identification and quantification, and requests for exploitation plans, but they need to be articulated and operationalized under the theoretical framework and approach previously presented, in order to be helpful in the process of establishing an efficient AMEBR system.

Castilla, *et al.* (1993), Jeréz and Potocnjak (1993) and Pavéz (1993) report that AMEBR as presently defined tends to induce a mono-specific resource exploitation. This involves risks of over-exploitation of ecologically important secondary resources, because such an exploitation pattern does not recognize important ecological interactions among the benthonic community. The adoption of the ecosystemic, integrated, dynamic, and quantitative methodological approach presented here in the design and implementation of AMEBR will help to prevent such risks.

Ponce and Ibarra (pers. com.), stress the legal and institutional difficulties arising from the option granted by the D.S. 355 to the fishermen organizations to apply for an aquaculture lease to further exploit the AMEBR, upon completion of the initial 2 year period. In spite of legal and institutional restrictions, if this potential problem is addressed from the perspective of the economic theory it may be shown that, if positive and significant social net benefits are generated over time by the AMEBR, such arrangement may be socially desirable. Associated with the above, Ponce and Ibarra (pers. com.), showed concerns with the fact that under the aquaculture lease arrangement, the fishermen organizations must pay an annual fee which may be too high for them. Again, if this potential problem is addressed from the perspective of the economic theory, for efficiency purposes that fee should be equal to the resource rent to be generated by the AMEBR, after all production factors and inputs are fully paid for. Thus, all things considered, the fishermen organization should not have problems paying the fee.

Finally, it is necessary to recognize that, in spite of the various problems here analyzed, the AMEBR system in Chilean artisanal fisheries represent an important management instrument upon which it is necessary to build, in order to focus into a more efficient and equitable resource allocation under a context of sustainable development.

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